

CLAIMS

Sub A. >
1. A method for determining a print quality capability indicator of an ink-jet hard copy apparatus based on current actual operational conditions of the apparatus, comprising
5 the steps of:

storing a plurality of predetermined ink-jet printing operation attributes related to output print quality;

monitoring a plurality of ink-jet printing operating characteristics in real time, wherein said operating characteristics are correlated to said attributes;

10 correlatively comparing said operating characteristics to said attributes;

based on said step of correlatively comparing, deriving a comparison function for each of the operating characteristics; and

15 assigning a valuation parameter based on the comparison function for each of the operating characteristics such that said valuation parameter is the print quality capability indicator representative of current actual operational conditions.

2. The method as set forth in claim 1, the step of storing a plurality of predetermined ink-jet printing attributes related to output print quality further comprising:

20 determining a set of operational attributes related to print quality produced by the ink-jet hard copy apparatus,

assigning a series of scaled values to each of said operational attributes such that each of the scaled values is representative of a predetermined level of performance of each of the respective operational attributes, and

25 storing a look-up table wherein a correlated scaled value is selected based on the current actual operating conditions.

3. The method as set forth in claim 2, the step of correlatively comparing said operating characteristics to said attributes further comprising:

30 selecting for a current operational attribute of the ink-jet hard copy apparatus the scaled value representative of a predetermined level of performance indicative of a current operational condition.

4. The method as set forth in claim 3, the step of deriving a comparison function for each of the operating characteristics further comprising:

normalizing each selected scaled value to a common standard.

5. The method as set forth in claim 4, the step of assigning a valuation parameter based on the comparison function for each of the operating characteristics such that said valuation parameter is the print quality capability indicator representative of current actual operational conditions further comprising:

deriving from a summation of each selected scaled value of all the printing attributes the value representative of print quality availability based on the current actual operational conditions of the hard copy apparatus.

6. A computerized method for selecting a print mode for an ink-jet hard copy apparatus, comprising the steps of:

storing a set of data indicative of ink-jet printing Operational Attributes related to output print quality;

monitoring print quality related ink-jet printing characteristics during printing operations;

comparing each of said characteristics to selected Operational Attributes and deriving a comparison value for each of said characteristics indicative of current operational functionality of the apparatus;

calculating a value function representative of expected print quality during a next subsequent printing operation as a function of all derived comparison values for each of said characteristics;

comparing said value function to a correlated preselected print quality value indicative of a predetermined print quality output; and

selecting the print mode for the next subsequent printing operation based on said comparing said value function to said correlated preselected print quality value indicative of a predetermined print quality output.

7. The method as set forth in claim 6, the step of storing a set of data indicative of ink-jet printing Operational Attributes further comprising:

selecting ink-jet printing operational attributes significantly affecting print quality by the hard copy apparatus, and

assigning a set of weighted values to each of said operational attributes such that one of said weighted values can be selected as an indication of a current operational condition of the hard copy apparatus as determined by said step of monitoring print quality related ink-jet printing characteristics during printing operations.

8. The method as set forth in claim 7, the step of selecting the print mode for the next subsequent printing operation based on said comparing said value function to said correlated preselected print quality value indicative of a predetermined print quality output further comprising:

if said preselected print quality value assigns a print mode having a faster throughput than a print mode based on said value function, and

if said hard copy apparatus is capable of print with a print quality at least equal to the print quality related to said preselected print quality value, printing in the print mode related to said preselected print quality value, or

if said print mode related to said preselected print quality value can not achieve the print quality preselected as determined by said step of comparing said value function to a correlated preselected print quality value indicative of a predetermined print quality output, over-riding selection of the print mode related to said preselected print quality value and printing in the print mode based on said value function.

9. A method for selecting a print mode for an ink-jet hard copy apparatus having a plurality of user selected print modes for rendering a plurality of print quality levels, comprising the steps of:

A) storing a set of ink-jet printing Operational Attributes;

B) monitoring print quality related ink-jet printing characteristics during printing operations;

C) comparing said characteristics to said Operational Attributes for deriving a comparison value representative of expected print quality during a next subsequent printing operation;

D) assigning a currently available print mode to said predetermined value;

E) comparing said currently available print mode to a user currently selected print mode; and

F) over-riding said currently selected print mode by selecting said currently available print mode when said currently selected print mode is insufficient to render an expected print quality level from the currently selected print mode of the plurality of user selected print modes.

10. The method as set forth in claim 9, comprising the steps of:

G) starting a printing job in a currently used print mode wherein the currently used print mode is either the currently selected print mode or the currently available print mode as determined in steps E) and F);

H) periodically halting said printing job; and

I) repeating steps B) through H) until said printing job is finished.

11. The method as set forth in claim 9, the step of storing a set of ink-jet printing Operational Attributes further comprising:

storing a data set for a plurality, "n," of Operational Attributes wherein a performance score is provided in a predetermined relationship to a series of performance levels of operation for each of the attributes such that the score is indicative of the related attribute positive or negative affect on print quality.

12. The method as set forth in claim 11, the step of comparing said characteristics to said Operational Attributes for deriving a comparison value representative of expected print quality during a next subsequent printing operation further comprising:

from said data set, each said comparison value is determined as a function of a weighted score, "WS," for each of the plurality of Operational Attributes, and where

$$WS = PS_{MAX} - (SW\% (PS_{MAX} - PS)),$$

where PS is an Operational Attribute performance score and SW% is predetermined subjective weighting factor.

13. The method as set forth in claim 12, further comprising the step of:
determining a total weighted score, "TWS," indicative of said currently available
print mode in accordance with the equation:

5 TWS = $WS_{1-n} \div n$.

14. A system for dynamic print mode selection in an ink-jet hard copy apparatus
having a plurality of end-user selectable print quality levels, comprising:

10 sensor means for real-time monitoring of print quality related ink-jet printing
characteristics;

 coupled to said sensor means, memory means for storing data output from said
sensor means and for containing predetermined print mode operational instructions related
to print quality; and

15 processing means for encoding the data output from said sensor means as a value
representative of current operational print quality availability and for comparing current
operational print quality availability to desired print quality based on a currently selected
one of the end-user selectable print quality levels and for overriding the current end-user
selectable print quality level for the next printing operation and substituting a print mode
20 representative of achieving the current end-user selectable print quality level from said
predetermined print quality related ink-jet printing characteristics print quality related ink-
jet printing characteristics mode operational instructions when said current operational print
quality availability is not adequate to meet the print quality level of the current end-user
selectable print quality level.

25 15. The system as set forth in claim 14, the processing means further comprising:
 means for halting a printing operation periodically to re-evaluate said current
operational print quality availability and for re-comparing current operational print quality
availability to desired print quality based on a currently selected one of the end-user
selectable print quality levels and for restarting the printing operation in a print mode suited
30 to any changes in current operational print quality availability based on current said print
quality related ink-jet printing characteristics.